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On Intra Mode Mapping

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Outline

- Introduction
  - Intra mode mapping in current HM (4.0)

- Proposed Intra mode mapping

- Results

- Conclusions

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Introduction

- Intra mode mapping in current HM (4.0)
  - Four LUTs to map
    - 35 modes → 18 modes (4x4)
    - 35 or 18 modes → 10 modes (xxx)
    - 35 or 18 modes → 4 modes (64x64)
    - 35 or 18 modes → 6 modes (128)

```
const UChar g_aucAngModeMapping[4][35] = // intra mode conversion for most probable
{
 {3,  4,  3,  3,  5,  5,  5,  1,  1,  1,  1,  1,  1,  1,  3,  3,  3,  3,  3,  3,  3,  2,  2,  2,  2,  2,  2,  2,  2,  2,  3,  3,  3,  3},
//conversion to 5 modes
 {3,  4,  4,  3,  5,  5,  5,  3,  1,  1,  1,  3,  6,  6,  6,  3,  7,  7,  4,  3,  8,  8,  8,  3,  2,  2,  2,  3,  9,  9,  9,  3,  3,  3},
//conversion to 9 modes
 {3,  4,  4,  11, 11, 5,  12, 12, 1,  1,  1,  13, 13, 6,  6,  14, 14, 7,  15, 15, 8,  8,  16, 16, 2,  2,  2,  17, 17, 9,  9,  3,  3,  10},
//conversion to 17 modes
 {3,  3,  3,  3,  3,  3,  3,  1,  1,  1,  1,  1,  1,  1,  3,  3,  3,  3,  3,  3,  3,  2,  2,  2,  2,  2,  2,  2,  2,  2,  3,  3,  3,  3}
//conversion to 3 modes
};
```

  - A couple of minor issues (bugs?) in software

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Proposed Unified Single Mapping

- All "out of range" prediction modes are mapped to PLANAR.

```
if ( iLeftIntraDir >= g_aucIntraModeNumAng[iIdx] )
    iLeftIntraDir = 0;


if ( iAboveIntraDir >= g_aucIntraModeNumAng[iIdx] )
    iAboveIntraDir = 0;
```

- Remove table and table lookup

- Simplify software and coding procedure

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Results

	All Intra HE			All Intra LC		
	Y	U	V	Y	U	V
Class A	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%
Class B	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
Class C	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Class D	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%
Class E	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Overall	0.0%	0.0%	0.1%	0.0%	0.1%	0.1%
	0.0%	0.1%	0.1%	0.0%	0.1%	0.1%
Enc Time[%]	99%			98%		
Dec Time[%]	100%			100%		

Supplementary Results

- If current PU is 4x4 (18 modes) and neighboring predictor mode falls between 18 and 34, do mapping

  MAPPING[17] = {10,4,5,5,1,1,6, 6,7, 4,8,8,2,2,9,9,10}

- Otherwise use single mapping to PLANAR

	All Intra HE			All Intra LC		
	Y	U	V	Y	U	V
Class A	0.0%	-0.1%	0.0%	0.0%	0.0%	0.0%
Class B	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Class C	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Class D	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Class E	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Overall	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Enc Time[%]	100%			99%		
Dec Time[%]	100%			100%		

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Conclusion

- A unified single mapping method is proposed for Intra prediction mode mapping

  – Simplify software and coding procedure.

  – Very small BD-rate increase (0.0x%).

  – Negligible impact on encoding and decoding runtime.

- Recommend to adopt the proposed method.

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